Mitigation, Monitoring, and Reporting Plan for the California High-Speed Rail Program EIR/EIS

This mitigation, monitoring, and reporting plan is designed to fulfill Section 21081.6 of the California Environmental Quality Act (CEQA), which requires public agencies to adopt a reporting or monitoring program whenever a project or program is approved that includes mitigation measures identified in an environmental document. The mitigation strategies described below are for a program-level decision and are to be used to avoid, minimize, or reduce any potentially significant environmental impacts. Project-level activities will undergo future environmental analysis as required by NEPA and CEQA tiering from this EIS/EIR. As part of these second-tier environmental reviews, the lead agency for each of these projects will use the mitigation strategies identified in the program document as starting points to determine their applicability to a specific project and to develop additional mitigation measures for significant adverse impacts identified in the project-specific analysis. Because all the potential actions and impacts for tiered projects cannot be anticipated at a programmatic level, each project needs to select those strategies applicable to the impacts associated with the specific location and type of action. For purposes of CEQA, the mitigation strategies in the Final EIS/EIR also serve as mitigation measures at a programmatic level. The NEPA/CEQA monitoring process includes review, guidance, and reporting components. The lead agencies for second tier documents will note which applicable programmatic mitigation strategies are being adopted and used for mitigation measures and explain why others are not. The lead agencies will provide a schedule for implementing the adopted mitigation measures and for reviewing the implementation of those measures.

As a programmatic-level document, the Program EIR/EIS does not analyze site-specific impacts of potential alignments or stations; therefore, it cannot predict with certainty which impacts will occur and what site-specific mitigation measures are appropriate for the second-tier level of actions. Consequently, the Program EIR/EIS describes mitigation strategies that are approaches tailored to address the types of impacts anticipated as a result of construction of the HST system. These strategies will provide the basis to structure more site-specific measures when more detailed data on the impacts is available at the second-tier. In addition, the Authority has committed to design practices and policies that will be used to develop alignment alternatives at the project-level to avoid impacts and to help shape specific mitigation measures.

At this program level of planning, the Authority is responsible for tracking the mitigation and incorporating it into future studies that it undertakes, but a monitoring plan cannot yet be developed. For the next tiers of environmental analysis, a monitoring plan will be developed as part of each project-level analysis that includes more specific timing for the mitigation measures, and additional parties may be identified with responsibility for implementing the measures.

Resource Area	Impact Area	Mitigation Measure
Traffic and circulation	Traffic and circulation	Require that HST system stations serve as multi-modal transportation hubs providing easy connection to local/regional bus, rail and transit services, as well as providing bicycle and pedestrian access.
		Require the HST system to be grade-separated from all roadways to allow vehicular traffic to flow without impediment from the HST system.
		Work with local and regional agencies to develop and implement transit-oriented development strategies, as described in Chapter 6B, around HST stations.
		Work with local and regional agencies to identify, plan, coordinate, and implement traffic flow improvements around HST station locations during project-level planning. Such improvements may include: a. a construction phasing and traffic management plan for construction periods b. improving capacity of local streets with upgrades in geometrics such as providing standards roadway lane widths, traffic controls, bicycle lanes, shoulders and sidewalks c. modifications at intersections, such as signalization and/or capacity improvements (widening for additional left-turn and/or through lanes), and turn prohibitions d. signal coordination and optimization (including retiming and rephasing) e. designation of one-way street patterns near some station locations f. truck route designations g. coordination with Caltrans regarding nearby highway facilities
		Work with public transportation providers to coordinate services and to increase service and/or add routes, as necessary, to serve the HST station areas.
		Avoid parking impacts by developing and coordinating implementation at the project-level of parking improvement strategies consistent with local policies, including shared parking, off-site parking with shuttles, parking and curbside use restrictions, parking permit plans for neighborhoods near HST stations, and other parking management strategies.
Air quality	Localized air quality impacts due to congestion/traffic near HST stations	Assure that HST stations are multi-modal hubs and include appropriate parking
		Coordinate with local and regional public transportation providers to increase opportunities for connection between the HST system and other public transportation services.
		Work with local and regional agencies to implement local street and roadway improvements, including various traffic flow improvements and congestion management techniques, and parking management strategies to reduce localized pollution from traffic related to the HST system
	Short-term air quality impacts due to construction	Water all active construction areas at least twice daily.
		Require that all trucks hauling soil, sand, and other loose materials be covered or maintain at least two feet of freeboard.
		Pave, apply water three times daily, or apply non-toxic soil stabilizers on all unpaved access roads, parking areas and staging areas at active construction sites.
		Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at active construction sites.
		Sweep nearby streets daily (with water sweepers) if visible soil materials from HST system construction are carried onto adjacent public streets.
		Hydroseed or apply non-toxic soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).

Resource Area	Impact Area	Mitigation Measure
		Enclose, cover, water twice daily or apply non-toxic soil binders to exposed stockpiles of dirt, sand, etc.
		Limit traffic speeds on unpaved roads to 15 mph
		Install sand bags or other erosion control measures to prevent silt runoff to public roads.
		Replant vegetation in disturbed areas as quickly as possible.
		Use alternative fuels for construction equipment when feasible.
		Minimize equipment idling time.
		Maintain properly tuned equipment.
Noise	Increased noise from train operations and construction	Grade separations to eliminate grade crossing related noise.
		Noise barriers, such as sound walls, where there are severe noise impacts.
		Require noise reduction in HST equipment design and track structures design.
		Use of enclosures or walls to surround noisy equipment, and installation of mufflers on engines; substitution of quieter equipment or construction methods, minimizing time of operation and locate equipment farther from sensitive receptors.
		Where not already included, consider placing alignment sections in tunnel or trenches or behind berms where possible and where other measures are not available to reduce significant noise impacts.
		Suspend construction between 7:00 pm and 7:00 am and/or on weekends or holidays in residential areas where there are severe noise impacts.
		In managing construction noise take into account local sound control and noise level rules, regulations and ordinances.
		Ensure that each internal combustion engine would be equipped with a muffler of a type recommended by the manufacturer.
		Specify the use of the quietest available construction equipment where appropriate and feasible.
		Turn off construction equipment during prolonged periods of non-use.
		Require contractors to maintain all equipment and to train their equipment operators.
		Locate noisy stationary equipment away from noise sensitive receptors.
	Exposure to ground-borne vibration	Specify the use of train and track technologies that minimize ground vibration such as state of the art suspensions, resilient track pads, tie pads, ballast mats or floating slabs.
		Phase construction activity, use low impact construction techniques and avoid use of vibrating construction equipment where possible to avoid vibration construction impacts.
Energy	Increased energy use and electricity demand with the HST system	HST stations will be multi-modal hubs providing linkage for various transportation modes, which will contribute to increased efficiency of energy use for intercity trips and by commuters, and the stations will be required to be constructed to meet Title 24 California Code of Regulations energy efficiency standards.
		Design practices will require that the electrically powered HST technology be energy efficient, include regenerative braking to reduce energy consumption, and minimize grade changes in steep terrain to reduce energy consumption
		Design practices will require that localized impacts be avoided through planning and design of the power distribution system for the HST System.

Resource Area	Impact Area	Mitigation Measure
		Locate HST maintenance and storage facilities within proximity to major stations/termini.
	Energy use during construction of the HST system	Develop and implement a construction energy conservation plan.
		Use energy efficient construction equipment and vehicles.
		Locate construction material production facilities on-site or in proximity to project construction sites.
		Develop and implement a program encouraging construction workers to carpool or use public transportation for travel to and from construction sites.
Electromagnetic fields and electromagnetic interference	Exposure of electromagnetic fields to HST system workers, passengers, and nearby residents, schools and other facilities	Use standard design practices for overhead catenary power supply systems and vehicles, including appropriate materials, location and spacing of facilities and power supply systems to minimize exposure to receptors over distance, and shielding with vegetation and other screening materials.
		Design overhead catenary system, substations, and transmission lines to reduce the electromagnetic fields to a practical minimum.
	Electromagnetic interference with electronic and electrical devices	Design the overhead catenary system, substations, and transmission lines to reduce the electromagnetic fields to a practical minimum.
		Design the project component to minimize arcing and radiation of radiofrequency energy.
		Choose devices generating radiofrequency with a high degree of electromagnetic compatibility.
		Where appropriate, add electronic filters to attenuate radiofrequency interference.
		Relocate receiving antennas and use antenna models with greater directional gain where appropriate, particularly for sensitive receptors near the HST system.
		Comply with the FCC regulations for intentional radiators, such as the proposed HST wireless systems.
		Establish safety criteria and procedures and personnel practices to avoid exposing employees with implantable medical devices to EMF levels that may cause interference with such implanted biomedical devices.
Land use	Incompatibility with land uses and disruption to communities	Continue to apply design practices to minimize property needed for the HST system and to stay within or adjacent to existing transportation corridors to the extent feasible.
		Work with local governments to consider local plans and local access needs, and to apply design practices to limit disruption to communities.
		Work with local governments to establish requirements for station area plans and opportunities for transit oriented development.
		Work with local governments to enhance multi-modal connections for HST stations.
		Coordinate with cities and counties to ensure that HST facilities would be consistent with land use planning processes and zoning ordinances.
		Provide opportunities for community involvement early in project-level studies.
		Hold design workshops in affected neighborhoods to develop understanding of vehicle, bicycle, and pedestrian linkages in order to preserve those linkages through use of grade-separated crossings and other measures.
		Ensure that connectivity is maintained across the rail corridor (pedestrian/bicycle and vehicular crossings) where necessary to maintain neighborhood integrity.
		Develop facility, landscape and public art design standards for HST corridors that reflect the character of adjacent affected neighborhoods.

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		Maintain high level of visual quality of HST facilities in neighborhood areas by implementing such measures as visual buffers, trees and other landscaping, architectural design and public artwork.
	Impacts to neighborhoods during construction	Develop a traffic management plan to reduce barrier effects during construction.
		To the extent feasible maintain connectivity during construction.
Agricultural lands	Conversion of prime, statewide important, and unique farmlands, and farmlands of local importance, to project uses	Avoid farmland whenever feasible during the conceptual design stage of the project.
		Reduce the potential for impacts by sharing existing rail rights-of-way where feasible or by aligning HST features immediately adjacent to existing rail rights-of-way.
		Reduce the potential for impacts by reducing the HST right-of-way width to 50 feet in constrained areas.
		Increase protection of existing important farmlands by securing easements or participating in mitigation banks.
		Coordinate with and support the California Farmland Conservancy Program to secure conservation easements on farmland in geographic areas where the HST project creates impacts.
		Coordinate with private agricultural land trusts, local programs, mitigation banks, and Resource Conservation Districts to identify additional measures to limit important farmland conversion or provide further protection to existing important farmland.
	Severance of prime, statewide important, and unique farmlands, and farmlands of local importance, to project uses	Avoid farmland whenever feasible during the conceptual design stage of the project
		Minimize severance of agricultural land by constructing underpasses and overpasses at reasonable intervals to provide property access
		Work with landowners during final design of the system to enable adequate property access
		Provide appropriate severance payments to landowners.
Aesthetics and visual resources		At the project-level, design proposed facilities that are attractive in their own right and that would integrate well into landscape contexts, so as to reduce potential view blockage, contrast with existing landscape settings, light and shadow effects, and other potential visual impacts.
		Design bridges and elevated guideways with graceful lines and minimal apparent bulk and shading effects.
		Design elevated guideways, stations, and parking structures with sensitivity to the context, using exterior materials, colors, textures, and design details that are compatible with patterns in the surrounding natural and built environment, and that minimize the contrast of the structures with their surroundings.
		Use neutral colors and dulled finishes that minimize reflectivity for catenary support structures, and design them to fit the context of the specific locale.
		Use aesthetically appropriate fencing along rights-of-way, including decorative fencing, where appropriate, and use dark and non-reflective colors for fencing to reduce visual contrast.
		Where at-grade or depressed route segments pass through or along the edge of residential areas or heavily traveled roadways, install landscape treatments along the edge of the right-of-way to provide partial screening and to visually integrate the right-of-way into the residential context.
		Use the minimum amount of night lighting consistent with that necessary for operations and safety.

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		Use shielded and hooded outdoor lighting directed to the area where the lighting is required, and use sensors and timers for lights not required to be on all the time.
		Design stations to minimize potential shadow impacts on adjacent pedestrian areas, parks, and residential areas, and site all structures in a way that minimizes shadow effects on sensitive portions of the surrounding area.
		Seed and plant areas outside the operating rail trackbed that are disturbed by cut, fill or grading to blend with surrounding vegetated areas, where the land will support plants. Use native vegetation in appropriate locations and densities.
		Use strategic plantings of fast-growing trees to provide partial or full screening of elevated guideways where they are close to residential areas, parks, and public open spaces.
		Where elevated guideways are located down the median strips or along the edge of freeways or major roadways, use appropriate landscaping of the area under the guideway to provide a high level of visual interest. Landscaping in these area should use attractive shrubs and groundcovers, and emphasize the use of low-growing species to minimize any additional shadow effects or blockage of views.
		Plan hours of construction operations and locate staging sites to minimize impacts to adjacent residents and businesses.
Public utilities		Make adjustments to the HST system alignments and vertical profiles to avoid crossing or using major utility right-of-way or fixed facilities during engineering design.
		If avoidance is not feasible, in consultation and coordination with the utility owner, relocate or protect in place transmission lines, substations, and any other affected facilities.
		For acquisition projects which result in utility relocation, follow the uniformity and equitable treatment policies, and comply with the requirements, of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 for all property necessary for the proposed HST system.
Hazardous materials and wastes		Investigate soils and groundwater for contamination and prepare environmental site assessments when necessary.
		Design realignment of the HST corridors to avoid identified sites.
		Relocate HST associated facilities such as stations to avoid identified sites.
		Remediate identified hazardous materials and hazardous waste contamination.
		Prior to demolition of buildings for project construction, survey for lead-based paint and asbestos-containing materials.
		Follow BMP's for testing, treating, and disposing of water, and acquire necessary permits from the regional water quality control board, if ground dewatering is required.
		When indicated by project level environmental site assessments, perform Phase II environmental site assessments in conformance with the ASTM Standards related to the Phase II Environmental Site Assessment Process to identify specific mitigation measures.
		Prepare a Site Management Program/Contingency Plan prior to construction to address known and potential hazardous material issues, including a. Measures to address management of contaminated soil and groundwater; b. Site-specific Health and Safety Plan (HASP), including measures to protect construction workers and general public; and c. Procedures to protect workers and the general public in the event that unknown contamination or buried hazards are encountered.

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		As part of the second-tier environmental review, consider impacts to the environment on sites identified on the Cortese list (Government Code section 65962.4) at that time.
Cultural and paleon-tological resources	Impacts to archaeological resources and traditional cultural properties	Avoid the impact, or when avoidance cannot be accommodated, minimize the scale of the impact.
		Incorporate the site into parks or open space.
		Provide data recovery for the archaeological resources, which may include excavation of an adequate sample of the site contents so that research questions applicable to the site can be addressed.
		Develop procedures for fieldwork, identification, evaluation, and determination of potential effects to archaeological resources in consultation with SHPO and Native American tribes. Procedures may include on-site monitoring when sites are known or suspected of containing Native American human remains and be reflected in Memoranda of Agreement with appropriate bodies.
		Coordinate and consult with tribal representatives.
	Impacts to historic properties/ resources	Avoid the impact through project design. Prepare and utilize a treatment plan for protection of historic properties/resources that would describe methods to preserve, stabilize, shore/underpin, and monitor buildings, structures, and objects.
		Avoid high vibration construction techniques in sensitive areas.
		Record and document cultural resources that would be adversely affected by the project to the standards of the Historic American Building Survey or Historic American Engineering Record.
		Develop design guidelines to ensure sympathetic, compatible, and appropriate designs for new construction.
		Consult with architectural historians or historical architects to advise on appropriate architectural treatment of the structural design of proposed new structures. Prepare interpretive and/or educational materials and programs regarding the affected historic properties/resources. Materials may include: a popular report, documentary videos, booklets, and interpretive signage.
		Make interpretive information available to state and local agencies, such as salvage items, historic drawings, interpretive drawings, current and historic photographs, models, and oral histories. Also assist with archiving and digitizing the documentation of the cultural resources affected, and disseminating material to the appropriate repositories.
		Relocate and rehabilitate historic properties/resources that would otherwise be demolished because of the project.
		Monitor project construction to ensure it conforms to design guidelines and any other treatment procedures agreed to by the parties consulting pursuant to Section 106 of the National Historic Preservation Act. Repair inadvertent damage to historic properties/resources in accordance with the Secretary of the Interior's Standards for Treatment of Historic Properties.
		Salvage selected decorative or architectural elements of the adversely affected historic properties/resources, and retain and incorporate salvaged items into new construction where possible. If reuse is not possible, make salvaged items available for use in interpretive displays near the affected resources or in an appropriate museum.
		Implement an agreement with appropriate bodies specifying procedures for addressing historic resources which may be affected by the HST system.

Resource Area	Impact Area	Mitigation Measure
	Impacts to paleontological resources	Educate workers.
		Recover fossils identified during the field reconnaissance.
		Monitor construction.
		Develop protocols for handling fossils discovered during construction, such as temporary diversion of construction equipment so that the fossils could be recovered, identified, and prepared for dating, interpreting, and preserving at an established, permanent, accredited research facility.
Geology and soils	Seismic hazards	Design structures to withstand anticipated ground motion, using design options such as redundancy and ductility.
		Prevent liquefaction and resulting structural damage and traffic hazards using: (1) ground modification techniques such as soil densification; and (2) structural design, such as deep foundations.
		Utilize motion sensing instruments to provide ground motion data and a control system to temporarily shut down HST operations during or after an earthquake to reduce risks.
		Design and engineer all structures for earthquake activity using CalTrans Seismic design Criteria.
		Design and install foundations resistant to soil liquefaction and settlement.
		Identify potential serpentinite bedrock disturbance areas and implement a safety plan.
		Apply Section 19 requirements from the most current CalTrans Standard Specifications to ensure geotechnically stable slopes are planned and created.
		Install passive or active gas venting systems and gas collection systems in areas where subsurface gases are identified.
		Remove corrosive soil and use corrosion protected materials in infrastructure.
		Address erosive soils through soil removal and replacement, geosynthetics, vegetation, and or rip/rap, where warranted.
		Remove or moisture condition shrink/swell soils.
		Utilize stone columns, grouting, and deep dynamic compaction in areas of potential liquefaction.
		Utilize buttress berms, flattened slopes, drains, and/or tie-backs in areas of slope instability.
		Avoid settlement through preloading, use of stone columns, deep dynamic compaction, grouting, and/or special foundation designs.
	Surface rupture hazards	Install early warning systems triggered by strong ground motion associated with ground rupture, such as linear monitoring systems (i.e., time domain reflectometers) along major highways and rail lines within the zone of potential rupture to provide early warnings and allow for temporary control of rail and automobile traffic to avoid and reduce risks.
		Continue to modify alignments to avoid crossing known or mapped active faults within tunnels.
		Avoid active faults to the extent possible. Where avoidance is not possible, cross active faults at grade and perpendicular to the fault line.
	Slope instability	Install temporary and permanent slope reinforcement and protection, based on geotechnical investigations, and review of proposed earthwork and foundation excavation plans.
		Conduct geotechnical inspections during construction to verify that no new, unanticipated conditions are encountered.

Resource Area	Impact Area	Mitigation Measure
		Incorporate slope monitoring in final design.
	Difficulty in excavation	Identify areas of potentially difficult excavation to ensure safe practices.
		Focus future geotechnical engineering and geologic investigations in areas of potentially difficult excavation.
		Monitor conditions during and after construction.
		Employ tunnel excavation and lining techniques to ensure safety.
	Hazards related to oil and gas fields	Follow federal and state Occupational Safety and Health Administration regulatory requirements for excavations.
		Consult with other agencies such as the Department of Conservation's Division of Oil and Gas, or the Department of Toxic Substances Control regarding known areas of concern.
		Use safe and explosion-proof equipment during construction.
		Test for gases regularly.
		Install monitoring systems and alarms in underground construction areas and facilities where subsurface gases are present.
		Install gas barrier systems.
Hydrology and water resources	Impacts on floodplains	Avoid or minimize construction of facilities within floodplains where feasible.
		Minimize the footprint of facilities within the floodplain, through design changes or the use of aerial structures and tunnels.
		Restore the floodplain to its prior operation in instances where the floodplain is impacted by construction.
	Impacts on surface waters	Use construction methods and facility designs to minimize the potential encroachments onto surface water resources.
		Minimize sediment transport caused by construction by following best management practices (BMPs) as part of National Pollutant Discharge Elimination System (NPDES) and Storm Water Pollution Prevention Plan requirements that will be included in construction permits. BMPs may include measures such as: a. providing permeable surfaces where feasible; b. retaining and treating stormwater onsite using catch basins and filtering wet basins; c. minimizing the contact of construction materials, equipment, and maintenance supplies with stormwater; d. reducing erosion through soil stabilization, watering for dust control, installing perimeter silt fences, placing rice straw bales, and installing sediment basins; e. maintaining water quality by using infiltration systems, detention systems, retention systems, constructed wetland systems, filtration systems, biofiltration/bioretention systems, grass buffer strips, ponding areas, organic mulch layers, planting soil beds, sand beds, and vegetated systems such as swales and grass filter strips that are designed to convey and treat either fallow flow (swales) or sheetflow (filter strips) runoff.
		Use methods such as habitat restoration, reconstruction of [habitat] onsite, and habitat replacement offsite to minimize surface water quality impacts.
		Comply with mitigation measures included in permits issued under sections 404 and 401 of the federal Clean Water Act.
		Comply with requirements in the Storm Water Pollution Prevention Plan to reduce pollutants in storm water discharges and the potential for erosion and sedimentation.

Resource Area	Impact Area	Mitigation Measure
		Comply with requirements of section 10 of the federal Rivers and Harbors Act for work required around a water body designated as navigable and applicable permit requirements.
		Comply with the requirements of a state Streambed Alteration Agreement for work along the banks of various surface water bodies.
		Implement a spill prevention and emergency response plan to handle potential fuel or other spills.
		Where feasible, avoid significant development of facilities in areas that may have substantial erosion risk, including areas with erosive soils or steep slopes.
	Impacts on groundwater	Minimize development of facilities in areas that may have substantial groundwater discharge or affect recharge.
		Apply for, obtain, and comply with conditions of applicable waste discharge requirements as part of project-level review.
		Develop facility designs that are elevated, or at a minimum are permeable, and would not affect recharge potential where construction is required in areas of potentially substantial groundwater discharge or recharge.
		Apply for and obtain a Storm Water Pollution Prevention Plan for grading, with Best Management Practices that would control release of contaminants nears areas of surface water or groundwater recharge. Best Management Practices may include constraining fueling and other sensitive activities to alternative locations, providing drip plans under some equipment, and providing daily checks of vehicle condition.
		Use and retain native materials with high infiltration potential at the ground surface in areas that are critical to infiltration for groundwater recharge.
Biological resources and wetlands	Impacts to sensitive vegetation communities	Utilize existing transportation corridors and rail lines to minimize potential impacts.
		Use large diameter tunnels as part of the design to limit surface access needs in tunnels for ventilation or evacuation, as a method to avoid or limit impacts to vegetation and habitat above tunnels.
		Use in-line construction (i.e., use new rail infrastructure as it is built) to transport equipment to/from the construction site and to transport excavated material away from the construction to appropriate re-use or disposal sites to minimize impacts from construction access roads on vegetation/habitat.
		Accomplish necessary geologic exploration in sensitive areas by using helicopters to transport drilling equipment and for site restoration to minimize surface disruption.
		Use and reuse excavated materials within the confines of the project.
		Participate in or contribute to existing or proposed conservation banks or natural management areas, including possible acquisition, preservation, or restoration of habitats.
		Revegetate/restore impacted areas, with a preference for on-site mitigation over off-site, and with a preference for off-site mitigation within the same watershed or in close proximity to the impact where feasible.
		Comply with the Biological Resources Management Plan(s) developed or identified during project-level studies, as reviewed by the USFWS, CDFG, and USACE.
		Conduct pre-construction focused biological surveys.
		Conduct biological construction monitoring.
		Undertake plant relocation, seed collection, plant propagation, and outplanting at suitable mitigation sites.

Resource Area	Impact Area	Mitigation Measure
		Prevent the spread of weeds during construction and operation by identifying areas with existing weed problems and measures to control traffic moving out of those areas such as cleaning construction vehicles or limiting the movement of fill.
	Impacts to wildlife movement corridors	Construct wildlife underpasses, bridges, and/or large culverts, to facilitate known wildlife movement corridors.
		Ensure that wildlife crossings are of a design, shape, and size to be sufficiently attractive to encourage wildlife use.
		Provide appropriate vegetation to wildlife overcrossings and undercrossings to afford cover and other species requirements.
		Establish functional corridors to provide connectivity to protected land zoned for uses that provide wildlife permeability.
		Design protective measures for wildlife movement corridors using the following process in consultation with resource agencies: a. Identify the habitat areas the corridor is designed to connect b. Select several species of interest from the species present in the area c. Evaluate the relevant needs of each selected species d. For each potential corridor, evaluate how the area will accommodate movement by each species of interest e. Draw the corridors on a map f. Design a monitoring program
		Utilize existing transportation corridors and rail lines to minimize potential impacts.
		Use aerial structures or tunnels to allow for unhindered crossing by wildlife.
	Impacts to non-wetland jurisdictional waters	Utilize existing transportation corridors and rail lines to minimize potential impacts.
		Return degraded habitat to pre-existing conditions.
		Create new habitat by converting non-wetland habitats into wetland or other aquatic habitat.
		Enhance existing habitats by increasing one or more functions through activities such as plantings or non-native vegetation eradication.
		Provide for passive revegation by allowing a disturbed area to revegetate naturally.
		Purchase credits in an existing wetlands or aquatic habitat mitigation bank.
		Provide in-lieu fee payments to an agency or other entity who will provide aquatic habitat conservation or restoration.
		Prefer on-site mitigation over off-site mitigation, and for off-site mitigation prefer that located within the same watershed or as close in proximity to the area of impact as possible.
	Impacts to wetlands	Utilize existing transportation corridors and rail lines to minimize potential impacts.
		Return degraded habitat to pre-existing conditions.
		Create new habitat by converting non-wetland habitats into wetland or other aquatic habitat.
		Enhance existing habitats by increasing one or more functions through activities such as plantings or non-native vegetation eradication.
		Provide for passive revegation by allowing a disturbed area to revegetate naturally.
		Purchase credits in an existing wetlands or aquatic habitat mitigation bank.
		Provide in-lieu fee payments to an agency or other entity who will provide aquatic habitat conservation or restoration.

Resource Area	Impact Area	Mitigation Measure
		Develop and implement measures to address the “no net loss” policy for wetlands.
		Prefer on-site mitigation over off-site mitigation, and for off-site mitigation prefer that located within the same watershed or as close in proximity to the area of impact as possible.
	Impacts to marine and anadromous fishery resources	Utilize existing transportation corridors and rail lines to minimize potential impacts.
		Comply with the terms of a Streambed Alteration Agreement for work along banks of surface water bodies.
		Implement a spill prevention and emergency response plan to handle potential fuel or other spills.
		Incorporate bio-filtration swales to intercept runoff.
		Where feasible, avoid significant development of facilities in areas that may have substantial erosion risk, including areas with erosive soils and steep slopes.
	Impacts to special status species	Utilize existing transportation corridors and rail lines to minimize potential impacts.
		Relocate sensitive species.
		Conduct pre-construction focused surveys.
		Conduct biological construction monitoring.
		Restore suitable breeding and foraging habitat.
		Purchase credits from an existing mitigation bank.
		Participate in an existing Habitat Conservation Plan.
		Phase construction around the breeding season.
Public parks and recreation resources	Impacts to parks and recreational resources	Continue to apply design practices to avoid impacts to park resources, and when avoidance cannot be accommodated, minimize the scale of the impact
		Apply measures at the project level to reduce and minimize indirect/proximity impacts as appropriate for the particular sites affected, while avoiding other adverse impacts (e.g., visual), such as noise barriers, visual buffers and landscaping.
		Apply measures to modify access to/egress from the recreational resource to reduce impacts to these resources.
		Design and construct cuts, fill, and aerial structures to avoid and minimize visual impacts to units of the state park system.
		Incorporate wildlife under or over crossings at appropriate intervals as necessary.
		Where public parklands acquired with public funds would be acquired for non-park use as part of the HST system, commit as required by law to providing funds for the acquisition of substantially equivalent substitute parkland or to acquiring/providing substitute parkland of comparable characteristics for construction impacts.
		Restore affected park lands to natural state and replace or restore affected park facilities.
		If park facilities must be relocated, provide planning studies as well as appropriate design and replacement with minimal impact on park use.
		Use local native plants for revegetation.
		Develop and implement construction practices, including scheduling, to limit impacts to wildlife, wildlife corridors and visitor use areas within public parks.
		For temporary unavoidable loss of park and recreation facility uses consider providing compensation.

Resource Area	Impact Area	Mitigation Measure
Cumulative	Impacts on traffic and circulation and travel conditions	The following program level mitigation strategies can be developed, in consultation with state, federal, regional, and local governments and affected transit agencies, to improve the flow of intercity travel on the primary routes and access to the proposed stations or airports and will reduce this impact: 1. Regional strategies would include coordination with Regional Transportation planning and Intelligent Transportation System Strategies. 2. Local improvements could employ TSM/Signal Optimization; local spot widening of curves; and major intersection improvements.
		The following program level mitigation strategies can be developed, in consultation with state, federal, regional, and local governments and affected transit agencies, to improve the flow of intercity travel on the primary routes and access to the proposed stations or airports and will reduce this impact: 1. Regional strategies would include coordination with Regional Transportation planning and Intelligent Transportation System Strategies. 2. Local improvements could employ TSM/Signal Optimization; local spot widening of curves; and major intersection improvements.
	Impacts on air quality	The project level mitigation strategies to address localized impacts can consider the following and will reduce this impact: 1. Increase emission controls from power plants supplying power for the HST Alternative. 2. Design the system to utilize energy efficient, state-of-the-art equipment. 3. Promote increased use of public transit, alternative fueled vehicles, and parking for carpools, bicycles, and other alternative transportation methods. 4. Alleviate traffic congestion around passenger station areas. 5. Minimize construction air emissions.
	Impacts on noise and vibration	The program level mitigation strategies relate to the following and will reduce this impact: 1. design practices emphasizing the use of tunnels or trenches 2. use of electric powered trains, higher quality track interface, and smaller lighter and more aerodynamic trainsets; and 3. full grade separations from all roadways.
		The project level mitigation strategies include the following and will reduce this impact: 1. treatments for insulation of buildings affected by noise and vibration; 2. sound barrier walls within the right-of-way; 3. track treatments to minimize train vibrations; and 4. construction mitigation.
	Impacts on land use and planning, communities and neighborhoods, property, and environmental justice	The program level mitigation strategies for HST Alternative contributions to the land use impacts, include the following and will reduce this impact: 1. Design practices to maximize use of existing rights-of-way and incorporating strategies for stations to incorporate transit oriented design. 2. Coordination with cities and counties in each region to ensure that project facilities would be consistent with land use planning processes and zoning ordinances.

Resource Area	Impact Area	Mitigation Measure
	Impacts on agricultural lands	The program level mitigation strategies include the following and will reduce this impact: 1. design practices to avoid agricultural land conversion through maximizing use of existing rights-of-way to minimize encroachment on additional agricultural lands 2. utilizing aerial structure or tunnel alignments to allow for vehicular and pedestrian traffic access across the alignment; and 3. reducing the new right-of-way to 50 feet in constrained areas.
		The project level mitigation strategies include the following and will reduce this impact: 1. securing easements, 2. participating in mitigation banks, 3. increasing permanent protection of farmlands at the local planning level, and 4. coordinating with various local, regional, and state agencies support farmland conservation programs.
	Impacts on aesthetics and visual resources	The program level mitigation strategies include the following and will reduce this impact: 1. design practices that will incorporate local agency and community input during subsequent project level environmental review in order to develop context sensitive aesthetic designs and treatments for infrastructure.
		The project level mitigation strategies include the following and will reduce this impact: 1. design of facilities that integrate into landscape contexts, reducing potential view blockage, contrast with existing landscape settings, and light and shadow effects.
	Impacts on public utilities	The program level mitigation strategies include the following and will reduce this impact: 1. design practices that will avoid potential conflicts, at the project level analysis, to the extent feasible and practical. These practices include: design methods to avoid crossing or using utility rights-of-way include modifying both the horizontal and vertical profiles of proposed transportation improvements. Emphasis would be placed on detailed alignment design to avoid potential contribution to cumulative impacts from linear facilities on land use opportunities and to minimize conflicts with existing major fixed public utilities and supporting infrastructure facilities.
		The project level mitigation strategies include the following and will reduce this impact: 1. coordination with utility representatives during construction in the vicinity of critical infrastructure will occur.
	Impacts on cultural and paleontological resources	The program level mitigation strategies include the following and will reduce this impact: 1. Continued consultation with SHPO would occur to define and describe general procedures to be applied in the future for fieldwork, method of analysis, and the development of specific mitigation measures to address effects and impacts to cultural resources, resulting in a programmatic agreement between the Authority, FRA and SHPO. 2. Consultation with Native American tribes would occur.

Resource Area	Impact Area	Mitigation Measure
		The project level mitigation strategies include the following and will reduce this impact: 1. avoidance measures through identification of sensitive resources within the project level analysis and project design refinement and careful selection of alignments. 2. subsequent project level field studies to verify the location of cultural resources would offer opportunities to avoid or minimize direct impacts on resources, based on the type of project, type of property, and impacts to the resource.
	Impacts on geology and soils	The program level mitigation strategies include the following and will reduce this impact: 1. Design practices will be used while preparing extensive alignment studies to ensure that potential effects related to major geologic hazards such as major fault crossings, oil fields, and landslide areas, will be avoided. 2. Mitigation for potential impacts will be developed on a site-specific basis, based on detailed geotechnical studies to address ground shaking, fault crossings, slope stability/landslides, areas of difficult excavation, hazards related to oil and gas fields, and mineral resources.
	Impacts on hydrology and water resources	The program level mitigation strategies include the following and will reduce this impact: 1. design practices to maximize use of existing rights-of-way to minimize potential impacts on water resources.
		The project level mitigation strategies include the following and will reduce this impact: 1. Avoidance and minimization measures would be incorporated into the development, design, and implementation phases. 2. Close coordination will occur with the regulatory agencies to develop specific design and construction standards for stream crossings, infrastructure setbacks, erosion control measures, sediment controlling excavation/fill practices, and other best management practices. 3. Mitigation strategies specific to reconstruction, restoration, or replacement of the resource will occur, in close coordination with state and federal resource agencies, related to flood plains; surface waters, runoff, and erosion; and groundwater.
	Impacts on biological resources and wetlands	The program level mitigation strategies include the following and will reduce this impact: 1. design practices to maximize use of existing rights-of-way to minimize potential impacts on biological resources and wetlands.

Resource Area	Impact Area	Mitigation Measure
		The project level mitigation strategies include the following and will reduce this impact: 1. Avoidance and minimization measures would be incorporated into the development, design, and implementation phases. 2. Close coordination will occur with the regulatory agencies to develop specific design and construction standards for stream crossings, infrastructure setbacks, monitoring during construction, and other best management practices. 3. Mitigation strategies specific to reconstruction, restoration, or replacement of the resource will occur, in close coordination with state and federal resource agencies, related to wetlands. 4. Field studies would be conducted to verify the location, in relation to the HST alignments, of sensitive habitat, wildlife movement corridors, and wetlands. These studies would provide further opportunities to minimize and avoid potential impacts on biological resources through changes to the alignment plan and profile in sensitive areas. For example, the inclusion of design features such as elevated track structures over drainages and wetland areas and wildlife movement corridors would minimize potential impacts to wildlife and sensitive species.
	Impacts on Section 4(f) and 6(f) resources (public parks and recreational resources)	The program level mitigation strategies include the following and will reduce this impact: 1. Incorporation of sound barriers (e.g., walls, berms or trenches), visual buffers/landscaping, and modification of transportation access to/egress from the public lands and recreational resource. 2. Incorporation of design modifications or controls on construction schedules, phasing, and activities.
		The project level mitigation strategies include the following and will reduce this impact: 1. Beautification measures. 2. Replacement of land or structures or their equivalents on or near their existing site(s). 3. Tunneling, cut and cover, cut and fill of right-of-ways. 4. Treatment of embankments. 5. Planting, screening, creating wildlife corridors, acquisition of land for preservation, installation of noise barriers. 6. Establishment of pedestrian or bicycle paths. 7. Other potential mitigation strategies could be identified during the public input process.

Resource Area	Impact Area	Mitigation Measure
		In the event that HST alignments or facilities are located within or in close proximity to public parks, the following mitigations for natural, cultural, aesthetic and recreational impacts may be considered to offset the contribution to the cumulative impact, including but not limited to: 1. Compensation for temporary and loss of park and recreation use. 2. Recordation of any historic features removed. 3. If necessary, provide alternative shuttle access service to park visitors. 4. Restore directly impacted park lands to a natural state. 5. If any facilities must be relocated, provide planning studies as well as design and appropriate replacement with minimal impact on park use. 6. Inventory and record affected historic structures. Provide appropriate mitigation for adverse effects to historic structures. 7. Require appropriate vehicle cleaning for all construction equipment used near units of the California State Park System to protect against spreading exotic plants or disease. 8. Use local native plants for revegetation. 9. Design and construct cuts, fills, and aerial structures to avoid and minimize visual impact to units of the State Park System. 10. In addressing impacts to wildlife movement corridors and habitat directly related to California State Park System units, consult with the California Department of Parks and Recreation. 11. Incorporate wildlife under- or over-crossings as necessary. 12. Adopt construction practices to protect critical wildlife corridors and visitor use areas within public parks.